SEND two postage stamps (six cents) to this office for a copy of "Hints on Estimating," a pamphlet of thirty-two pages. It gives the prices of labor and material, for all kinds of work connected with the building trades.

OUR eleven packages contain over 5000 hints, rules, tables and recipes, of great value to the carpenter, joiner, builder or contractor.

Lessons in Projection.

BY ROBERT RIDDELL, TEACHER OF THE ARTISAN CLASS IN THE HIGH SCHOOL, PHILADELPHIA.

Plate 70.

ON the problem shown in this plate rests the true theory of hand-railing, and the student should thoroughly master it in every particular. The correctness of the method shown for obtaining the ellipse N may be proved by cutting the lines XXXX through the paper, and then folding over the lines OOOO, and then raising the cut parts until S A stands perpendicular over the plan D. The curve N will then stand directly over the quarter circle on the plan. The methods of finding the long and short diameters, and the foci of the ellipse, have been explained in previous issues of the WOOD-WORKER. Pins are placed in the foci in order that the ellipse may be described by the aid of a thread or fine string; this process will be readily understood by referring to Fig. 1, Plate 22, March number.

We would advise the student to copy this plate entire two or three times, or until the principle involved is thoroughly understood, and the knowledge gained will doubly repay the trouble.

The Sectorian System of Hand-Railing.

NINTH PAPER.

Plate 66.

THIS plate exhibits a full circle stairs, and the well-hole enclosed with tangents, either for quadrant or octagon angles, by which wreaths in either four or eight pieces can be obtained. Where all the divisions are made equal, the same moulds, both face and falling, will answer for any section of rail. The moulds are applied, and all the twists and ramps obtained, as laid down in preceding examples. The framing is as easily put up in this example as the one shown in former plates, and is the most economical of any I have ever used in my practice, and equally as substantial.

Fig. 1 shows the ground plan, and had best be laid down on the floor where required to be built.

Fig. 2 is the stretch-out of the wreath piece for one fourth of the circle, and is best where it is the desire to avoid many joints, though I do not see the same objection to joints that many do, when properly made. I would prefer a joint to a cross-grained piece in a wreath always.

Fig. 3 is the quarter-wreath piece, obtained in the usual way, with its tangents and chord line, segment, etc.

Fig. 4 is the lower wreath face mould, with the tangents as obtained from A, B, C, Fig. 1, and drawn as shown on this figure. The lower end of Fig. 2 gives an idea of the falling ease, and is the shape of the centre falling mould, the convex and concave falling moulds being obtained as in former examples.

Practical Carpentry.

HIP-ROOFS.

IN its most simple form the *hip-roof* is a quadrilateral pyramid, each triangular side of which is a *hip*, and the rafter in each angle is a *hip-rafter*. The *common rafters* which lie between the hip-rafters in the planes of the sides of the roof, and which, by abutting on the hip-rafters, are necessarily shorter than the length of the sloping side, are called *jack-rafters*.

The things required to be determined in a hip-roof are these, viz.:

1. The angle which a common rafter makes with the plane of the wall-head—that is, the angle of the slope of the roof.
2. The angle which the hip-rafters make with the wall head.
3. The angles which the hip-rafters make with the adjoining planes of the roofs. This is called the backing of the hip.
4. The height of the roof.
5. The lengths of the common rafters.
6. The lengths of the hip-rafters.
7. The length of the wall-plate contained between the hip-rafter and next adjacent entire common rafter.

The first, fourth, fifth, and seventh of these are generally given, and then all the others can be found from them by construction, as is about to be shown.

The plan of a building and the pitch of the roof being given, to find the lengths of the rafters, the backing of the hips, and the shoulders of the jack rafters and purlins:

PLATE 69.—Let A B C D (*Fig.* 1) be the plan of the roof. Draw G H parallel to the sides A D, B C, and in the middle of the distance between them. From the points A B C D, with any radius, describe the curves *a b*, *a b*, cutting the sides of the plan in *a b*. From these points, with any radius, bisect the four angles of the plan in *r r r r*, and from A B C D, through the points *r r r r*, draw the lines of the hip-rafters A G, B G, C H, D H, cutting the ridge line G H in G

and H, and produce them indefinitely. The dotted lines $c\ e$, $d\ f$, are the seats of the last entire common rafters. Through any point in the ridge line I, draw E I F at right angles to G H. Make I K equal to the height of the roof, and join E K, F K: then E K is the length of a common rafter. Make G o, H o equal to I K, the height of the roof; and join A o, B o, C o, D o, for the lengths of the hip-rafters. If the triangles A o G, and B o G, be turned round their seats, A G, B G, until their planes are perpendicular to the plane of the plan, the points o o, and the lines G o, G o, will coincide, and the rafters A o, B o be in their true positions.

Let A B C D (*Fig.* 2) *be the plan of an irregular roof, in which it is required to keep the ridge level:*

Bisect the angles of two ends by the lines A b, B b, C G, D G, in the same manner as before; and through G draw the lines G E, G F parallel to the sides C B, D A, respectively, cutting A b, B b in E and F; join E F: then the triangle E G F is a flat, and the remaining triangle and trapeziums are the inclined sides. Join G b, and draw H I perpendicular to it: at the points M and N, where H I cuts the lines G E, G F, draw M K, N L perpendicular to H I, and make them equal to the height of the roof: then draw H K, I L for the lengths of the common rafters. At E set up E m perpendicular to B E; make it equal to M K or N L, and join B m for the length of the hip-rafter; and proceed in the same manner to obtain A m, C m, D m.

To find the hip and valley rafters of a compound irregular roof (*Fig.* 3):

In the compound roof shown by the plan, in which the ridge is level throughout, although the buildings are of different widths, the method of proceeding to find the hip and valley rafters of the right-lined parts of the roof is the same as in the two former cases, and will be evident on inspection. In the circular part proceed as follows: Draw $c\ d$ a radius to the curve, as the seat of one pair of the common rafters $c\ b$, $d\ b$, and bisect it in a: through a describe the curve $k\ a$ W $n\ a$, which is the seat of the circular ridge: produce the lines of the other ridges to meet this curved line in a W k, and connect the angles of the meeting roofs with these points, as in the drawing: divide the seat of one pair of the common rafters in each roof, as X Y, P Q, T U, and $e\ f$, into the same number of equal parts; and through the points of division draw lines parallel to the sides of their respective roofs, intersecting the curved lines drawn through the points of the curved roof; and through the points of intersection draw the curves C, l, m, a, etc., which give the lines of the hips and valleys. On C a, the meeting of the left-hand roof with the circular roof, erect $a\ b$ at a, and make it equal to the height of roof; and join C b for length of valley rafter: proceed in the same manner for the hip-rafter Z b; and for the other hip and valley rafters.

To find the valley rafters at the intersection of the roof B *with the conical roof* E (*Fig.* 4):

Let D H, F H be the common rafters of the conical roof, and K L, I L, the common rafters of the smaller roof, both of the same pitch. On G H set up G e equal to M L, the height of the lesser roof, and draw $e\ d$ parallel to D F, and from d draw $c\ d$ perpendicular to D F. The triangle D $d\ c$ will then by construction be equal to the triangle K L M, and will give the seat and the length and pitch of the common rafter of the smaller roof B. Divide the lines of the seats in both figures, D c, K M, into the same number of equal parts; and through the points of division in E, from G as a centre, describe the curves $c\ a$, $2g$, $1f$, and through those in B, draw the lines $3f$, $4g$, M a, parallel to the sides of the roof, and intersecting the curves in $f\ g\ a$. Through these points trace the curves C $f\ g\ a$, A $f\ g\ a$, which give the lines of intersection of the two roofs. Then to find the valley rafters, join C a, A a; and on a erect the lines $a\ b$, $a\ b$ perpendicular to C a and A a, and make them respectively equal to M L; then C b, A b is the length of the valley rafter, very nearly.

Correspondence.

We invite communications from our readers in matters connected with the trades we represent. Be brief, courteous, and to the point.

Editor of Illustrated Wood-Worker:

The packages of drawing received all right; am very much pleased with them, also with "Hints on Estimating," which is well worth the money. I take the Wood-Worker through our news-agent here, and like it very much and join with Mr. Randolp in wishing that it might be published weekly, as it is a first-class paper and suited to the wants of all wood-workers.

E. D. Sawin.

Springfield, Vermont, Aug. 4, 1879.

Editor of Illustrated Wood-Worker:

I have taken your Illustrated Wood-Worker from the first, and am much pleased with it. There are many fine designs contained therein, but still there seems to be something wanting especially to the *Amateur*, and that is, a working model and a guide for measurement. I think each book-case, etc. should have a skeleton drawing accompanying it, so marked that it could be easily determined how to put it together. The outside does not give any idea of how the inside is

PLATE 68

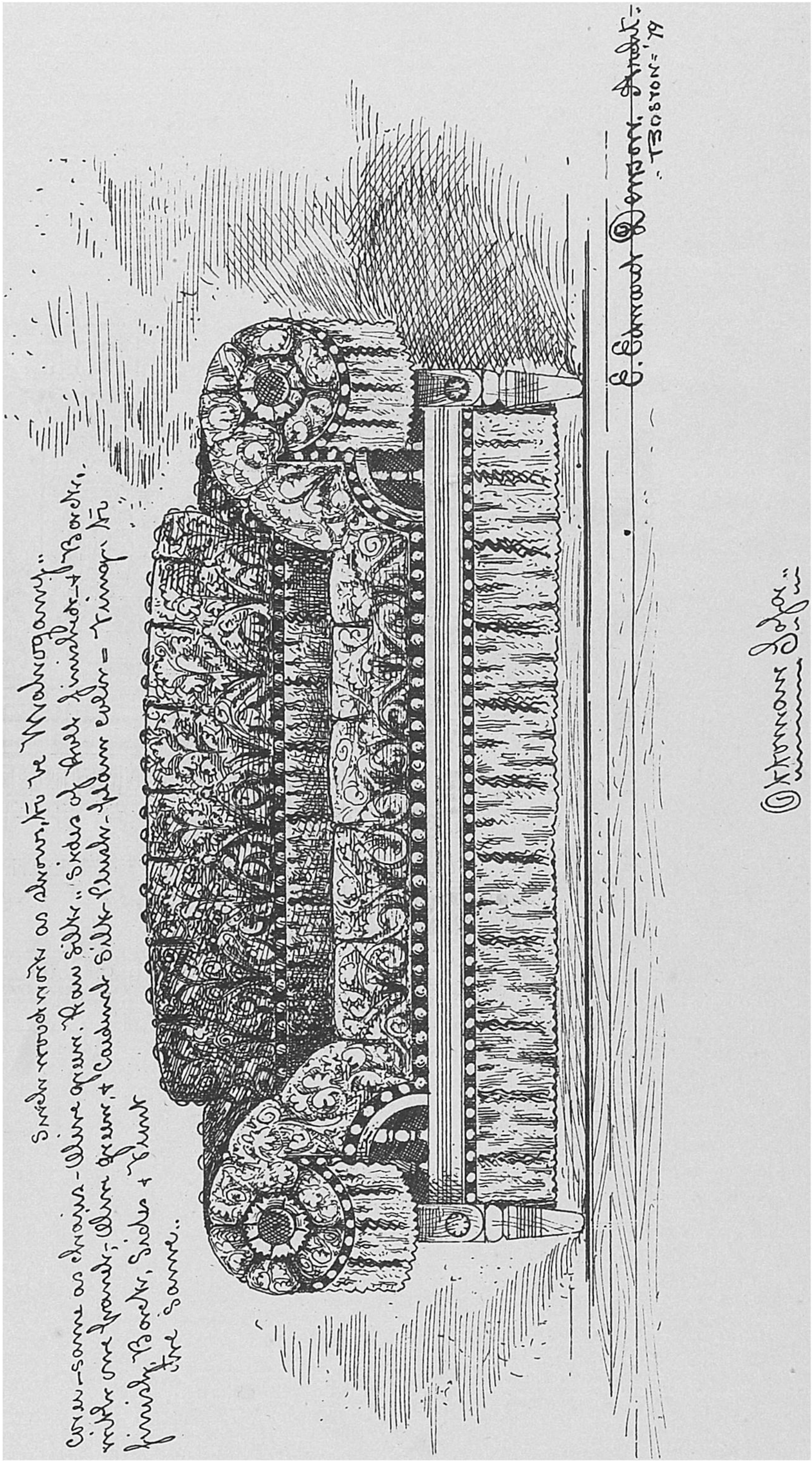
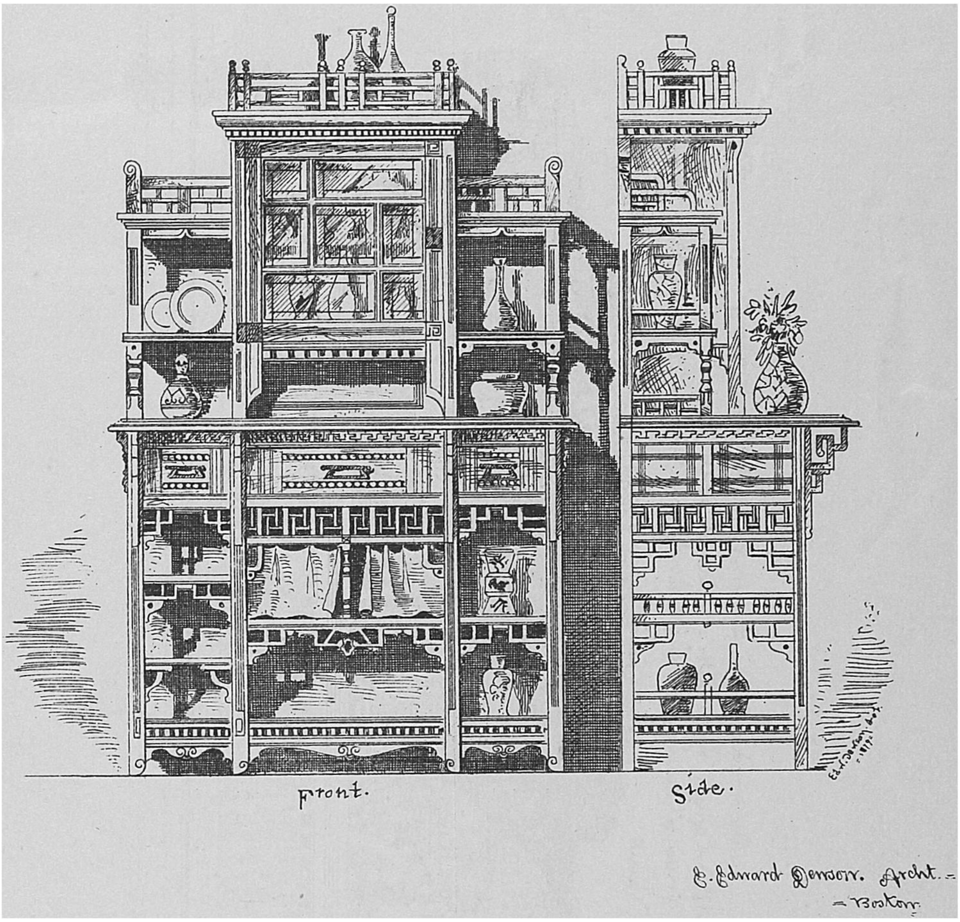
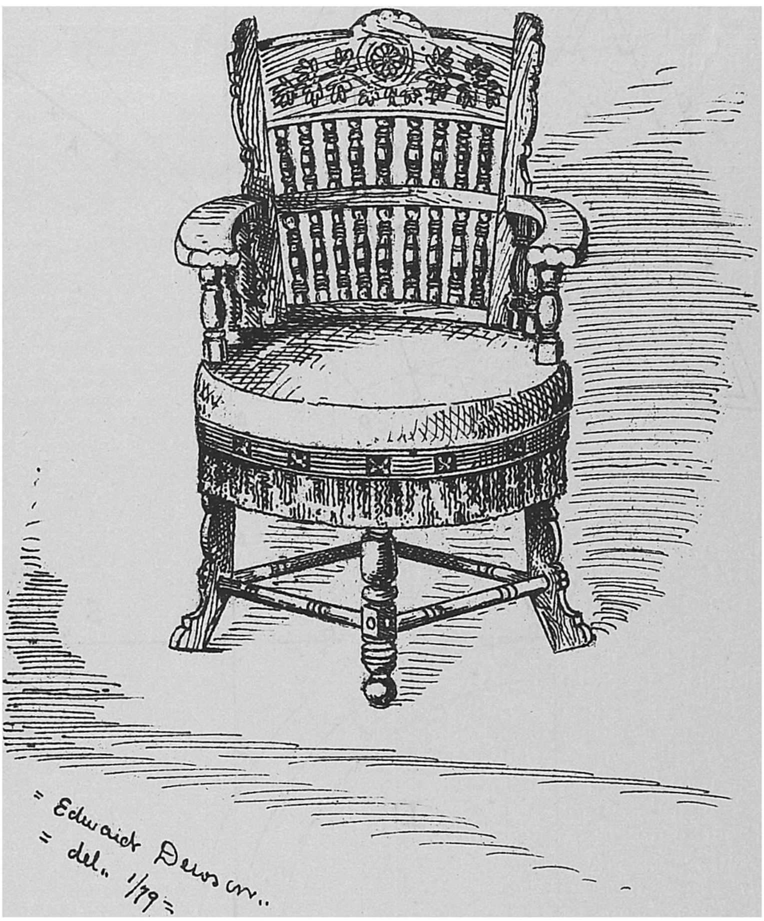

Sofa woodwork as drawn, to be Mahogany.
Cover—same as chairs—Olive green raw silk; sides of back finished + border with one band; olive green + cardinal silk plush plain center—fringe to finish. Back, sides + front the same.
E. Edward Dewson, Archt.
Boston '79
Ottoman Sofa

PLATE 69



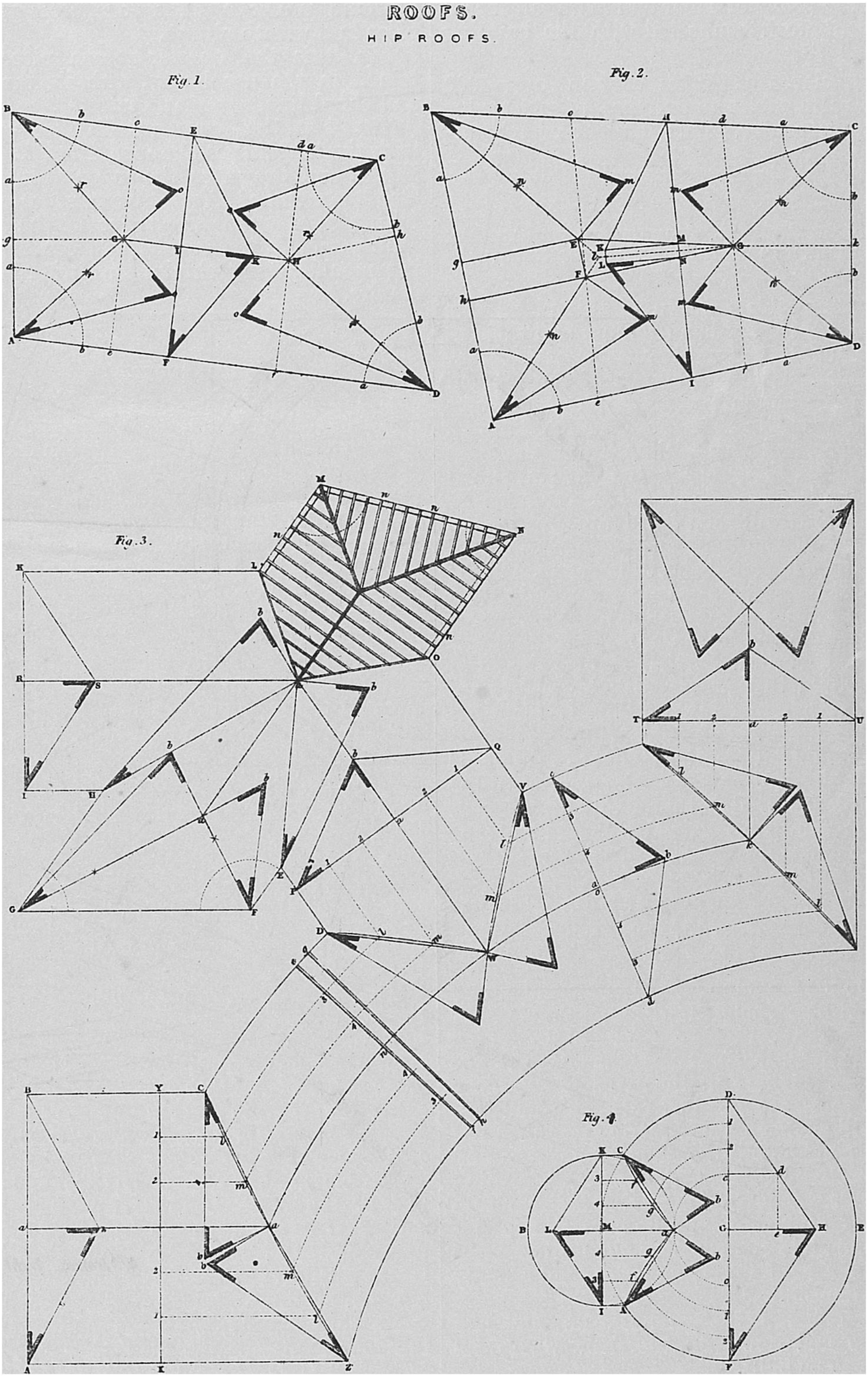
Small·Japanese·Cabinet.

PLATE 71



DRAWING ROOM CHAIR

PLATE 67



PRACTICAL CARPENTRY.